**Order optimization of dexmedetomidine for sleep hygiene in the intensive care unit**

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**Background:** Lack of restorative sleep is a frequent problem in the intensive care unit (ICU) and consequences of sleep disturbances include ICU delirium, prolonged duration of mechanical ventilation, and impaired immune function. There are limited pharmacologic treatment options available for restorative sleep and many are associated with unwanted side effects. Dexmedetomidine is an alpha-2-adrenergic agonist used for sedation of mechanically ventilated patients in the ICU. Given its ability to achieve light sedation, studies examined the use of dexmedetomidine for sleep in critically ill patients and have shown improved efficiency of sleep, shifted sleep mainly to the night, and increased sleep time. In 2018, the dexmedetomidine infusion order panel in the electronic medical record at UVA Health was updated to allow the selection of sleep hygiene as an indication, in addition to sedation, within one order panel. Since the addition of sleep hygiene as an indication, there has been discordance between dexmedetomidine when ordered and administered for sleep hygiene.

**Objective:** The aim was to reduce the mean number of discordant order elements of dexmedetomidine for sleep hygiene to less than 2 by April 10, 2022.

**Methods:** The Plan-Do-Study-Act (PDSA) method was utilized for this study. Between January 1, 2020 and December 31, 2020, there were a total of 373 dexmedetomidine orders indicated for sleep hygiene, of which, a random sample of 30 orders were included. This sample served as the baseline data to identify the need for improvement and to aid in measuring progress after implementation of interventions. The five discordant order elements identified between order and administration were discordance of titration interval time, starting dose, maximum rate, duration of infusion >12 hours, and titration dose. A process map was created to visually depict the step-by-step workflow for ordering and administering dexmedetomidine for sleep hygiene. Using the process map, a cause and effect diagram was created to categorize potential causes that led to the discordance between order and administration of dexmedetomidine. In addition, a Pareto chart was used to identify the frequency of discordance and the cumulative impact, to help with placing a greater emphasis on order elements with a higher frequency. After evaluating the current process and identifying potential causes of the discordance, a multidisciplinary team consisting of pharmacists, nurses, and physicians designed interventions such as optimizing the order panel and formulary, developing institutional practice guidelines, and providing education to healthcare professionals to help optimize the process. A priority matrix was developed to prioritize the interventions based on their impact compared to the effort involved to implement. The first PDSA cycle began when all three interventions were implemented on March 1, 2022 and ended on April 10, 2022 when post-intervention dexmedetomidine orders were evaluated. There were 28 orders for dexmedetomidine that were evaluated during the first PDSA cycle. A statistical process control (SPC) chart was used to evaluate the impact of inventions and a cost analysis was completed. A Fisher’s Exact Test was used to compare the number of discordant order elements before and after the interventions with significance set *a priori* at *p* < 0.05.

**Results:** Baseline data collected from the random sample of 30 orders showed that the mean number of discordant order elements of dexmedetomidine for sleep hygiene was 2.5 out of 5 possible discordant order elements. After implementation of the first PDSA cycle, the mean number of discordant order elements decreased to 1.96 out of 5 possible order elements. Prior to implementation of the interventions, the number of infusions continued for 12 hours or greater occurred in 14 of 30 orders and decreased to 1 of 28 orders after the interventions (*p* = 0.0002). However, discordance of titration dose occurred in 13 of 30 orders before the interventions and increased to 24 of 28 orders after the interventions (*p* < 0.0001). The difference in number of discordant order elements of starting dose, max rate, and interval time were not statistically significant before and after the interventions. Lastly, streamlining dexmedetomidine on the institution’s formulary is anticipated to lead to cost savings of up to $180,000 per year.

**Conclusion:** The PDSA method was effective at reducing discordance between order and administration of dexmedetomidine for sleep hygiene. In addition, it led to the unintended benefit of cost savings at UVA Health with the implementation of interventions. Future direction includes implementing the second PDSA cycle by developing titration protocols and providing more education to further reduce discordance.